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ABSTRACT

This study examined the critical thinking skills of resident and commuter students during the freshmen year, controlled for precollege background and ability. Differences in commuter and resident students' experience, particularly aspects of academic and social integration were also considered. The study sample was a subset taken from a national longitudinal study of factors influencing learning and cognitive development in college (sponsored by the National Center on Postsecondary Teaching, Learning, and Assessment). The sample consisted of 326 resident students and 316 commuter students attending 6 of the 18 institutions reported in the data. A precollege survey gathered information on student demographic and background characteristics. Students were tested on college entry using the Collegiate Assessment of Academic Proficiency (CAAP), and at the end of the freshman year with the CAAP reading comprehension, mathematics, and critical thinking modules. Additionally, measures of students' freshman-year experiences were derived from the College Student Experiences Questionnaire. No differences in critical thinking skill development were found between resident and commuter students during the first year of college. Findings suggest that students' out-of-classroom experiences and interactions can influence cognitive development during college. (Contains 50 references). (SW)

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THE IMPACT OF COLLEGE RESIDENCE ON THE DEVELOPMENT OF CRITICAL THINKING SKILLS IN COLLEGE FRESHMEN

by

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This paper was presented at the annual meeting of the Association for the Study of Higher Education held in Albuquerque, New Mexico, November 6-9, 1997. This paper was reviewed by ASHE and was judged to be of high quality and of interest to others concerned with higher education. It has therefore been selected to be included in the ERIC collection of ASHE conference papers.

The Impact of College Residence on the Development of Critical Thinking Skills in College Freshmen

A substantial body of research on the impact of college on students (particularly the role of residence in student development) has provided an empirical foundation for the focus on residence as a factor in the education of the college student in recent decades. This research documents the influential role of the student residence on a range of outcomes. These outcomes include: aesthetics, cultural and intellectual values; sociopolitical liberalism; secularism; self-esteem; autonomy, independence, and internal locus of control; persistence in college and degree attainment; and use of principled reasoning in judging moral issues (Anderson, 1981; Astin, 1972, 1973, 1975, 1982; Baird, 1969; Chickering, 1974; Chickering and Kuper, 1971; Chickering, McDowell and Campagna, 1969; Herndon, 1984; Matteson, 1974; Pace, 1984; Pascarella and Chapman, 1983; Pascarella and Terenzini, 1991; Rest and Deemer, 1986; Rich and Jolicoeur, 1978; Scott, 1975; Sullivan and Sullivan, 1980; Welty, 1976; Wilson, Anderson and Fleming, 1987). Differences between residents and commuters on these outcomes persist even when controlling for gender, race, socioeconomic status, secondary school achievement, academic ability and precollege levels of the outcome in question. These findings suggest that residence may be a factor that transcends the influence of various background variables on the subject outcomes.

However, the general body of research on the impact of residence is limited in providing an understanding of the influence of residence on cognitive outcomes. In a single institution study, Pascarella, Bohr, Nora, Zusman, Inman and Desler (1993) found significant differences between residents and commuters in freshman year gains in critical thinking even when precollege critical thinking, academic motivation, age, credit hours taken, and work responsibilities were statistically equated. These findings suggest the need for further investigation of the cognitive impact of residence.

The research on the development of critical thinking skills during the college years generally suggests that: 1) college attendance positively impacts the development of critical thinking skills; 2) special programs, courses or instructional styles can target improvement in critical thinking skills; and 3) there is little independent variation in critical thinking development attributable to different curricular interests or experiences such as physical sciences in comparison with social sciences.

Collectively, the research supports the notion that the totality of the college experience is more important than particular attributes of a program of study. This notion suggests that there are aspects of the general college experience, rather than particular disciplinary differences, that influence cognitive development during college. The problem then becomes in defining the out-of-class experiences that constitute a 'commonality' of experience for undergraduate college students and to delineate variations in this experience.

Building on the foundation of research on how critical thinking develops during college and the extensive research on differences in the resident/commuter student experiences, this study explores aspects of the college experience which might be associated with this development. Given existing theory and evidence, increased levels of involvement in the educational and interpersonal systems of an institution that are linked with living on campus are likely to foster relatively greater levels of cognitive growth in residents than would occur in their commuter counterparts.

This study sought to test this hypothesis by examining the change in critical thinking skills of resident and commuter students while controlling for pre-college background and ability. A second stage of analysis tested the influence of involvement measures thought to be associated with the ability to think critically. These measures were tested as mediating factors in the development of critical thinking skills during college. Specifically, we hypothesized that: 1) there are statistically significant differences in the critical thinking development of commuter and resident students during the freshman year; and 2) these differences can be explained, in part, by differences in the commuter/resident student experience (particularly aspects of academic and social integration). This approach is consistent with the recommendation of Kuh (1993) in citing the need for research which links cocurricular with specific outcomes.

Defining Critical Thinking

Pascarella (1985a) defined cognitive outcomes as "those measures having to do with the utilization of higher-order intellectual processes such as analysis, synthesis, reasoning, logic, and knowledge comprehension" (p. 3). There are a number of concepts falling under the broad definition of higher order intellectual abilities -- e.g., conceptual level, intellectual flexibility, reflective judgement and critical thinking. Common to these concepts is the ability to reason through the evaluation of evidence in addressing a dilemma.

Critical thinking is a concept that "encompasses such intellectual capabilities as the formulation of concepts, the ability to analyze arguments and supporting data, and the ability to think abstractly and to discriminate among abstractions"(Pascarella, 1985a, p.6). Most definitions in the literature similarly describe critical thinking. For example:

> "the ability to properly construct and evaluate arguments" (Facione, 1986, p. 222);
>
> "reflective and reasonable thinking that is focused on deciding what to believe or do" (Ennis, 1985, p. 1);
>
> "an investigation whose purpose is to explore a situation, phenomenon, question, or problem to arrive at a hypothesis or conclusion about it that integrates all available information and that can therefore be convincingly justified" (Kurfiss, 1988, p. 2).

These definitions demonstrate the multi-dimensionality of the concept of critical thinking. Watson and Glaser (1980) described critical thinking as a composite of attitudes, knowledge, and skills. The composite includes: "(1) attitudes of inquiry ... an acceptance of the general need for evidence ... (2) knowledge of valid inferences, abstractions, generalizations ... (3) skill in employing and applying the above attitudes and knowledge" (p. 1). This view supports the notion that grounding in content knowledge on a subject (the 'facts') is vital in critical thinking, but the abilities to analyze and synthesize (evaluation and interpretation) are necessary to complete the framework of critical thinking skills. Research has shown that critical thinking (as measured by the Watson-Glaser Appraisal) correlates with intelligence (as measured by objective tests of general intelligence), but the overlap is not complete (Landis, 1976).

Research on the Impact of Residence

Understanding pre-enrollment differences is important when examining the differential impacts of college on commuter and resident students. Chickering and Kuper (1971) examined the experiences of college students from data collected by the American Council on Education and the Project on Student Development in Small Colleges directed by Chickering from 1965 to 1970. The study revealed differences between residential and commuter students which the authors broadly referred to as the "differences between the haves and the have-nots."(p. 257). In this statement, they summarized the general findings that the parents of resident students had higher incomes and more education. In addition, these students achieved better grades in high school and scored higher on aptitude tests.

Marked pre-college differences between students who reside on campus and those who commute to college have been well documented since Chickering and Kuper's (1971) account. National survey data, including data collected by the American Council on Education, the Cooperative Institutional Research Program, and National Longitudinal Study of the High School Class of 1972, reveal that initial differences between the two groups cover a broad range of characteristics. Students who choose to reside on campus come from higher socioeconomic backgrounds, have higher degree aspirations, higher initial commitment to the institution that they attend, and anticipate a higher level of social involvement in college than their commuter counterparts. In addition, residential students received higher grades during high school and came to college with higher academic aptitude as measured by preadmission tests (Chickering, 1974; Chickering and Kuper, 1971; Levin and Clowes, 1982; Pascarella, 1984; Welty, 1976).

Academic Achievement In College

In spite of the wide range of initial differences between resident and commuter students, once enrolled, academic achievement as measured by students' grades does not differ significantly between the two groups. This finding is consistent in the research even when controlling for pre-college ability (Baird, 1969; Chickering, 1974; Graff and Cooley, 1970; Pascarella, 1984; Pugh and Chamberlain, 1976). This finding is interesting in light of findings that commuter students less frequently: participate in honors programs, do extra reading, study in a library, or discuss school work with friends (Chickering, 1974).

Looking at college academic life in a broader context, notable differences between resident and commuter students surface. Using the Cooperative Institutional Research Program data covering 5,162 students, Pascarella (1985b) examined the influence of residential status on students' ratings of their own academic abilities (academic self-confidence). The data revealed that the influence of living situation on self-rated academic abilities is indirect, mediated by social integration measures. In other words, campus residence influences how the student is involved in the campus which in turn, impacts the student's ratings of her or his academic abilities. These results suggest that campus residence directly influences factors of the college experience, particularly how the student is socialized in the campus, which, in turn, might affect other aspects of the academic experience.

Social and Interpersonal Outcomes

The research on the relationship of residential status to social activity and interpersonal experiences (with whom a student socializes) in college support the notion that resident students are consistently more involved in the college social systems. There is much evidence, for example, that resident students participate in college extracurricular cultural and social activities more frequently than their commuter counterparts (Baird, 1969;

Chickering, 1974; Chickering and Kuper, 1971; Nelson, 1982; Welty 1976). In addition, residents tend to develop more college friends early in their college years than commuters (Welty, 1976).

Persistence and Graduation

Following Tinto's theory (1975, 1987) of drop-out behavior, the more a student is integrated into the academic and social systems of an institution, the less likely he or she is to drop out. Research on residential status and academic and social integration implies that on-campus residence would have a positive influence on persistence. Generally, this hypothesis holds true in the research. Living on campus as opposed to commuting is significantly and positively associated with persistence even when precollege factors such as high school grades, academic major, and socioeconomic status are taken into account (Astin, 1975; Chickering, 1974; Nelson, 1982; Pascarella and Chapman, 1983; Levin and Clowes, 1982; Velez, 1985).

Cognitive Development

Much of the research on the impact of residence on intellectual development focuses on academic achievement (i.e., grades). However, some studies have used independent measures of cognitive development such as various critical thinking appraisals to assess development. For example, in a single institution study, Pascarella, et.al., (1993) examined the freshman year gains in reading, mathematics, and critical thinking skills as measured by the Collegiate Assessment of Academic Proficiency (CAAP) developed by the American College Testing Program (ACT). The critical thinking portion of CAAP measures the ability to clarify, analyze, evaluate, and extend arguments. Controlling for pre-test ability, academic motivation, student age, credit hours taken, hours employed, and residence, resident students showed a significantly larger increase ($p < .01$) in critical thinking than students who commuted to campus. Differences in commuter and resident student gains in reading comprehension and mathematics reasoning were non-significant. In discussing the results, the authors suggested that student cognitive growth might stem from a wholeness of the college experience which includes the enhanced interactions with both faculty and peers fostered by residing on campus. This study raises questions as to what specific aspects of the 'college experience' are different for resident and commuter students.

The sparse research on the relationship between residential status and cognitive development supports the need for further investigation. The research cited here is evidence of the relationship of residence and cognitive development during college. Specifically, in one study, resident students showed higher levels of change in measures of cognitive development even when statistically controlling for pre-college differences between the two groups. However, these findings provide only speculation that academic and social integration measures such as level of peer and faculty interaction may explain differences in cognitive development between resident and commuter students. Incorporating these college experience and integration measures into the design of a study may offer insight into the indirect, but significant, role that residence plays in cognitive development of students.

Theoretical Model

Research shows that college attendance has a positive effect on cognitive development. However, the literature does not address which particular aspects of the college experience contribute to cognitive growth. The research and readings which aid in defining the model suggest::

1) resident students show a significant increase in critical thinking over their commuter counterparts;
2) residence plays a pervasive role in the experience of college students, particularly in how and to what extent the student is involved in the academic and social systems of the institution;
3) social integration (with both faculty and other students) has a positive influence on student self-concept measures;
4) interactions with faculty contribute to self-perceived intellectual and personal development;
5) critical thinking is a concept which relies on attitudes of open-mindedness and the ability to absorb and evaluate information and general intellectual inquisitiveness.

The model builds on the above listed understandings anticipating that it will validate prior research on the positive impact of residing on campus on the development of critical thinking. In addition, we anticipate that analysis of the data will explain the differential cognitive development between resident and commuter students by differences in the college experience of these two groups.

The model can be viewed in blocks of variables which influence posttest critical thinking ability, the dependent variable. Background variables including age, academic motivation, pre-college critical thinking ability, work responsibility, and enrollment status (full- or part-time enrollment) exert influence over all the following variables in the model: residence, college integration measures and posttest critical thinking. Residence, the independent variable, influences integration and socialization variables which measure types of student involvement in campus life including student acquaintances, use of campus library facilities, interactions with faculty, and extracurricular involvement. Selected campus socialization measures defined as intervening variables impact the development of critical thinking. In the model, these measures are viewed as mediating factors.

Methods

Sample: The sample was a subset taken from a data set which included approximately 2400 entering freshmen at eighteen four-year colleges or universities who were part of a national longitudinal study of the factors influencing learning and cognitive development in college. The study was sponsored by the federally-funded National Center on Postsecondary Teaching, Learning, and Assessment (NCPTLA). The eighteen institutions participating in the study varied in size, control, and resident/commuter mix.

The sample used in this study included 671 students from six of the eighteen institutions represented in the data. The six institutions in the sample included: one community college, one liberal arts college, two research universities, one historical black institution, and one comprehensive, state university. These institutions were selected for this study because they represented a balance of commuter and resident students in the sample populations. The commuter/residential split of the total sample was 326 resident students (48.6% of the sample) and 316 commuter students (47.1% of the sample). Twenty-nine surveys (4.3%) were missing a residence category.

Initial data were collected in the Fall of 1992. The data collected included a precollege survey that gathered information on student demographic characteristics and background, and Form 88B of the Collegiate Assessment of Academic Proficiency (CAAP). A follow-up test of the sample took place in the Spring of 1993. This data collection included measures of the students' freshman-year experience (using the College Student Experiences Questionnaire) and Form 88A of the CAAP reading comprehension, mathematics, and critical thinking modules.

Measurement Instruments

The Collegiate Assessment of Academic Proficiency (CAAP) was designed by the American College Testing Program to assess general education foundational skills typically attained by the end of the first two years of college (ACT, 1990). The skills measured by the instrument include writing, mathematics, reading, science reasoning, and critical thinking. The critical thinking component is a timed test (forty minutes) and is comprised of thirty-two items covering four reading passages. The passages are representative of the kinds of issues commonly encountered in a postsecondary curriculum. A passage typically presents one or more arguments and uses a variety of formats, including case studies, debates, dialogues overlapping positions, statistical arguments, experimental results or editorials. The student reads a passage, then is asked to respond to a number of multiple choice questions which require interpretation and evaluation of the information in the passage to arrive at the most verifiable correct response. The test measures ability to clarify, analyze, evaluate and extend arguments.

The College Student Experiences Questionnaire (Pace, 1984, 1987,1990) is an instrument which measures the quality of effort students put into using the facilities and opportunities provided for their learning and development in college. The time spent in various out-of-classroom activities provides tremendous insight to the total college 'experience' for students. Quality of effort is measured by student reports of how often, during the school year, they engage in various activities related to the use of facilities and opportunities described in the questionnaire. The CSEQ provides: background information; an index of student's satisfaction with college; a report on the extent of their reading and writing ability; ratings of characteristics of the college environment; estimates of gain or progress toward important objectives. The Questionnaire has fourteen scales of College

Activities as measured by the quality of effort. Activities were selected to range along a quality of effort dimension, with some having greater potential for influencing learning and growth.

The National Center on Postsecondary Teaching, Learning & Assessment developed two survey instruments to gather general background and demographic information from students at the initial testing and during the follow-up. In addition, both the initial questionnaire and the follow-up survey contain a section to measure academic motivation. Examples from this section ask the student to express his/her level of agreement with statements such as: 'I enjoy investigating a topic of interest to me; I am willing to work very hard in a course in order to learn the material, even if it won't lead to a higher grade; I've read books or articles with which I strongly disagree.' The follow-up survey includes a section which solicits student evaluation of course content and of the instructor for a course in which the student is enrolled.

Variables

The dependent variable in this study is the end of freshman year (posttest) scores on the critical thinking assessment section of the CAAP instrument. The independent variable is student residence -- differentiating students who commute to campus from those who reside in university residence halls. This is a self-reported item asked in the NCTLA Follow-up Survey. Variations of student residential status such as living in an apartment (off-campus) or living in a sorority or fraternity (on-campus) are not included in the study.

The analysis statistically controlled for seven pre-enrollment characteristics: student age, gender, academic motivation, work responsibility, enrollment status, pre-college critical thinking ability, and average critical thinking level of incoming students (freshman cohort). The last two items are based on the pre-enrollment (pretest) scores on the critical thinking section of the CAAP instrument. The other variables in this block will be taken from the NCTLA pretest background information questionnaire. These variables are considered as a block as those characteristics and skills that the student carries into college -- the foundation for subsequent experiences at college.

The intervening variables were analyzed as factors differentiating the resident student experiences from those of the commuter student. Two blocks of intervening variables were noted -- the college environment scale and selected experience variables. The experience variables were taken from the CSEQ as self-reported measures of student experiences. The **College Environment Scale** measured the student's impression of the college environment rather than any specific experiences. A summary of all variable names and definitions is outlined in Table 1.

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TABLE 1: SUMMARY OF VARIABLE DEFINITIONS

Variable Name	Variable Definition	Source
Age	A continuous variable calculated by subtracting the self-reported year of birth from 1992.	NCTLA Precollege Survey
Male or Female	1 = male; 2 = female.	NCTLA Precollege Survey
Pre-College Critical Thinking Ability	Pre-enrollment composite score on critical thinking portion of CAAP.	CAAP
Academic Motivation	An eight item factorially-derived Likert-type scale taken during pre-enrollment data collection.	NCTLA Precollege Survey
Enrollment Status	A two-level item of enrolled hours determining full/part time enrollment status; 1 = less than 12 hours (parttime), 2 = twelve or more hours (fulltime).	NCTLA Follow-up Survey
Work Responsibility	A nine-level scale of average number of hours worked per week during the freshman year.	NCTLA Follow-up Survey
Average Critical Thinking Level of Incoming Class	Average pre-college CAAP score for cohort sample.	CAAP
Living on campus	A two-level item of residence status based on end of freshman year response. 2 = lived in college dorm; 1 = lived with parents/relatives.	CSEQ
College Environment Scale	An eight item scale based on students' perceptions of their college's emphasis on aspects of student development. Responses are on a seven level scale where 1 = weak emphasis to 7 = strong emphasis. Alpha = .85.	CSEQ
Student Acquaintances	A ten item scale based on diversity of student friends (e.g., "Made friends with students whose academic major field was very different from yours," "Had serious discussions with students from a country different from yours") rated on a 4-point scale where 1 = never and 4 = very often. Alpha = .92.	CSEQ
Library Use	A ten item scale based on students' use of campus library and library resources (e.g., "Used the library as a quiet place to read or study materials you brought with you," "Checked out books to read (not textbooks), where 1 = never and 4 = very often. Alpha = .88	CSEQ
Experiences with Faculty	A ten item scale based on students' interactions with faculty (e.g., "Talked with a faculty member," Visited informally and briefly with an instructor after class," "Worked with a faculty member on a research project"), rated on a 4-point scale where 1 = never and 4 = very often. Alpha = .92.	CSEQ

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Campus Extracurricular Involvement	A ten item scale based on students' experience with and involvement in campus clubs and organizations (e.g., "Looked in the student newspaper for notices about campus events and student organizations," "Attended a meeting of a club, organization or student government group) rated on a 4-point scale, where 1 = never and 4 = very often. Alpha =.93.	CSEQ
Cultural Experiences	A twelve item scale based on students' experience with and involvement in cultural events and activities (e.g., "Gone to an art gallery or art exhibit on the campus," "Seen a play, ballet, or other theater performance at the college") rated on a 4-point scale where 1 = never and 4 = very often. Alpha = .88.	CSEQ
Recreational Experiences	A ten item scale based on students' use of campus athletic facilities and attendance at athletic events (e.g, "Set goals for your performance in some skill," "Played on an intramural team") rated on a 4-point scale where 1 = never and 4 = very often. Alpha =.90	CSEQ
Information in Conversations	A six item scale based on students' integration of knowledge and expertise in everyday conversation ("e.g., "referred to knowledge you had acquired in your reading," "Persuaded others to change their minds as a result of the knowledge or arguments you cited") rated on a 4-point scale where 1 = never and 4 = very often. Alpha = .90.	CSEQ
Post-test Critical Thinking Ability	End of freshman year composite score on critical thinking portion of CAAP.	CAAP

Data Analysis Design:

The goals of the statistical design for this study were to: 1) determine the extent to which critical thinking development during the freshman year differs between the resident and commuter cohorts; and 2) examine the strength of influence of five intervening factors of the college experience affecting the development critical thinking.

The analysis was accomplished through a series of regression equations. Student scores on the posttest administration of the CAAP test served as the criterion or dependent variable. The predictor variables were entered as blocks of variables, specifically: 1) precollege characteristics and abilities; 2) student residence; 3) college environment; and 4) college involvement measures. Equation one regressed posttest critical thinking scores (the dependent variable) on the seven background variables. This equation allowed precollege characteristics and abilities to account for as much variation in posttest critical thinking scores as possible first. The second equation estimated the effect of residence on the dependent variable while statistically controlling for the precollege variables. This was the baseline equation which established the total effect of residence on critical thinking net of the background and precollege characteristics and abilities during the freshman year. A third equation regressed the college environment scale, student residence and precollege

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background and abilities, thus measuring the additional variation in posttest critical thinking explained by college environment. Finally, equation four incorporated measures of campus involvement taken from the CSEQ. As indicated earlier, it was anticipated that this equation would explain significant additional variation in the dependent variable. The inclusion of the student involvement measures in the final equation represented the impact of residence as mediated by the college environment and integration measures. The analysis was performed to determine to what degree, if any, the college experience variables rather than the living situation would account for posttest differences (if any were found) between the two groups. This design was consistent with earlier work by Lacy (1978) in his analysis of campus living environments on student values, intellectual orientation and personal development.

The R^2 change was examined as the basis for identifying the unique contribution of each block of variables to change in the dependent variable. To attempt to address concerns of statistically significant findings that are not substantively meaningful, the actual percentage of change was examined for usefulness as well.

Results

This model outlined four blocks of variables which were proposed to sequentially influence the end of freshman year critical thinking (the dependent variable). Background characteristics and precollege abilities were first entered. The variables in this block exert influence over the subsequent variables in the model which were residence, college environment, and campus involvement measures. Resident status was established as the independent variable. The college environment and campus involvement measures were viewed as intervening variables in the model.

The results of preliminary analyses indicated that multicollinearity (a high degree of intercorrelation among the independent variables) was not a problem in the specification of this model. Pedhazur (1982) has noted that the higher the intercorrelation among the independent variable, the greater the distortion in the estimation of the regression coefficients.

Results of the Multiple Regression Analysis

The major intent of the regression analysis was to determine if the sets of independent variables, representing student background and pre-college traits, student residence during college, students' impressions of the college environment (the college environment scale), and students' involvement behavior accounted for a significant proportion of variance in student cognitive development during the freshman year. And, if these variables did account for significant variation in the dependent variable, investigate which variables had the greatest influence on this outcome.

To determine if a given variable in the equation was different from zero while controlling for the other independent variables, and thus significant in influencing the dependent variable, the partial regression (unstandardized) coefficient associated with each variable was tested for significance. To interpret the magnitude of these variables in their influence on cognitive development, the strength of their respective standardized regression (Beta) coefficients were examined. Results of the regression analyses are given in Table 2. The change in the value of the R^2 accompanying the entry of each set of variables reflects the magnitude of that set of variable's net influence on year-end critical thinking ability above and beyond that attributable to students' precollege characteristics and the other preceding sets of variables.

The analysis found that, when controlling for precollege skills and characteristics, there were not differences in the critical thinking development between resident and commuter students during their first year of college. Similarly, students' assessment of the supportiveness of the college environment did not show a significant impact on the end of freshman year critical thinking skills. The inclusion of selected student involvement measures showed a modest, yet significant increase in the explained variance in the dependent variable.

TABLE 2: Regression Equations

Variable	Equation 1 Precoll. Characteristics and Abilities	Equation 2 College Residence	Equation 3 College Environment Scale	Equation 4 College Involvement Measures
1. Gender	.0082 (.0907)	.0133 (.1471)	.0168 (.1852)	-.0228 (-.2515)
2. Age	.0052 (.0062)	-.0068 (-.0081)	-.0052 (-.0062)	.0155 (.0185)
3. Acad Motivation	.0091 (.0961)	.0034 (.0360)	.0089 (.0936)	-.0328 (-.3469)
4. Precollege CT	.7053 (.7406)*	.7036 (.7388)*	.7017 (.7388)*	.6401 (.6721)*
5. Enrollment Hours	.0584 (.2400)	.0624 (.2566)	.0667 (.2742)	.0759 (.3118)*
6. Work Hours	-.0871 (-.1721)*	-.0994 (-.1965)*	-.0973 (-.1924)*	-.0825 (-.1631)*
7. Aver CT level at institution	.1034 (.7546)*	.0965 (.7043)*	.0954 (.6967)*	.1036 (.7562)*
8. Living on-campus		-.0618 (-.6172)	-.0612 (-.6118)	-.0643 (-.6430)
9. College Environment Scale			-.0339 (-.0251)	-.0356 (-.0267)
10. Student Acquaintances				.0266 (.0206)
11. Library Experiences				-.0797 (-.0705)*
12. Faculty Interactions				-.0539 (-.0537)
13. Extracurricular Involvement				.1180 (.0947)*
14. Athletic Involvement				-.1048 (-.0789)*
15. Information in Conversations				.0830 (.1189)
16. Cultural Experiences				.0581 (.0540)
R^2	.56145*	.56491*	.56599*	.59750*
R^2 Change		.00346	.00109	.03150*

Unstandardized coefficients are given in parentheses. * $p < .01$.

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Discussion and Implications

The purpose of the study was to examine differences in cognitive development of residential and commuter students in light of differences in college experiences for these students. As stated earlier in this paper, we proposed that there would be a differential impact of residence on cognitive development, however, this difference would be reduced to nonsignificant by including a selected set of college experience variables into the equation. These anticipated findings were grounded in prior research which has shown a differential impact of living on campus and commuting to college and research which has suggested that cognitive development during college was influenced by student experiences.

Influences on Cognitive Development

Precollege characteristics and abilities

The selected background and precollege characteristics and abilities explained fifty-six percent of the variation in the end of freshman year critical thinking scores. This finding is consistent with the general theoretical perspectives of Tinto (1975), Astin (1985), and Pace (1979, 1984), that precollege factors are strong indicators of college performance. In addition, the finding is not at all surprising given the particular precollege ability variables (pre-college critical thinking level and average critical thinking level of the sample) that were selected for use in the study.

Three of the seven variables in the first block significantly contributed to the explained variation. These variables were precollege critical thinking level, work hours and average critical thinking level of sample. Precollege critical thinking level and average critical thinking of the cohort were positively associated with the dependent variable. The work hours variable had a negative association.

Two of the three significant variables in this block were especially dominant in their explanatory influence. They were precollege critical thinking level of the sample and average critical thinking level of cohort. The average critical thinking of the cohort variable was viewed as a indication of the sample's peer group. Thus, the positive association between the average critical thinking level and the end of freshman year critical thinking was not surprising.

The work hour variable exerted a negative influence on critical thinking development. This finding is consistent with the research on the impact of employment during college which argues that work (particularly off-campus work) takes the student away from the intellectually challenging milieu of college often to perform mundane tasks (Anderson, 1981; Astin, 1975, 1982).

Residence During College

Contrary to prior research, residence during college did not significantly contribute to the explained variation in end of freshman year critical thinking. This finding is inconsistent with prior research on the relationship between cognitive development and residence (e.g., Pascarella, et. al., 1993; Welty, 1976). When considering an explanation for the finding of a nonsignificant association between campus residence and the development of critical thinking during freshman year, we looked in greater depth at the particular sample used in the study. As noted earlier, the sample was a subset of the National Center for the Study of Postsecondary Education survey. Samples from six of the participating twenty-three institutions were selected for inclusion in this study based on the fairly even distribution of residence hall and commuter populations in the institutional samples. Although the sample

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did provide an even distribution of resident and commuter respondents, the overall student demographics at each of the six institutions are predominantly commuter. These figures show a strong representation of predominantly commuter institutions in the sample in spite of the resident/commuter balance in the survey respondents from these institutions. Given the largely commuter enrollments at these institutions used in the study, interpretation of the data must acknowledge this bias in the sample.

A caveat on the interpretation of these data is necessary to assure that discussion of the results found here are placed in a proper context. That is, there are not significant differences in the development of critical thinking skills during the freshman year between resident and commuter students at these
predominantly commuter campuses.

Based on the large commuter student populations at the institutions used in the study, these institutions are more likely to design their institutional academic and social support programs to the demographics of their particular population. For example, a college where all students commute is likely to host a different range of support programs than a predominantly residential college. Thus, the commuter student might find a full host of academic and cocurricular support programs that accommodate a commuter schedule and needs.

College Environment Scale

Like the contribution of residence to explained variance, the contribution of the College Environment Scale was not statistically significant ($p < .01$).

College Involvement Measures

A central focus of this study was the explanatory power of the various involvement measures on the cognitive development during the first year of college. As outlined earlier, it was hypothesized that the impact of residence would become nonsignificant in this final equation due to the inclusion of the involvement measures. That is, the involvement factors would explain away the differences between resident and commuter students. As noted earlier, the college residence variable did not significantly contribute to the explained variance in the end of freshman year critical thinking. However, the addition of the seven college involvement variables did significantly increase the explained variance in the dependent variable (end of freshman year critical thinking) beyond the variance explained by the precollege and background variables, college residence and the college environment. Three of the seven variables in this block significantly contributed to the explained variance. They included:

Extracurricular Involvement: Not surprisingly, the coefficient for extracurricular involvement was positive. The extracurricular involvement variable was selected as a measure of students' involvement in college life outside the classroom. Prior research documents the association between extracurricular involvement and social integration in college. Presumably, social integration reinforces ties to the intellectual and academic life of the campus.

The positive influence of extracurricular involvement on cognitive development is consistent with the findings of Baxter Magolda (1992) in her study on the cocurricular influences on college students' intellectual development. This four-year longitudinal study used qualitative research methods to assess students' intellectual development during college. The study outlined students' reports of the impact of their cocurricular experiences on their development. Baxter Magolda suggested that students' interpretations of their experiences can be viewed as the result of their ways of knowing interacting with their

cocurricular environment. Baxter Magolda found that the challenges and supports presented to students through their cocurricular involvement positively influenced students' cognitive development. And, in some cases, cocurricular experiences offered challenges that were less prevalent in the academic arena.

It is remarkable and significant to find the very similar results of Baxter Magolda's (1992) qualitative study of students cocurricular development at a predominantly residential campus and the finding presented here relating extracurricular involvement to critical thinking development. These two studies came from different epistemological perspectives, used two distinctly different samples, yet arrived at the same conclusion relating the relevance of extracurricular involvement on cognitive development. This is a powerful replication of research findings on this relationship between extracurricular involvement and cognitive development.

Athletic Involvement: The coefficient for athletic involvement was negative which would suggest that increased levels of involvement in extramural sports and attendance at athletic events have a negative correlation with cognitive development in the content of this particular set of predictor variables.

While the athletic involvement variable did not measure intercollegiate athletic participation, it is useful to note the findings of Pascarella, Bohr, Nora and Terenzini (1995) on their investigation of the impact of intercollegiate athletic participation on freshman-year cognitive outcomes. The findings suggest that students who participate in intercollegiate athletics were generally at a disadvantage in cognitive outcomes. This research coupled with the finding here suggests that generally students who opt for the athletic interests, either as a participant or as a spectator, are at a disadvantage in cognitive development during the freshman year.

Library Use: The coefficient for library use was also negative which suggests that higher levels of library use as measured by this scale has a negative correlation with critical thinking development during the freshman year. This finding is counter-intuitive. However, the short longitudinal framework of this study might contribute to this usual finding. Anecdotal reports of freshman use of campus libraries suggests that libraries may serve as a social rather than academic influence during the first year. Freshmen may not be adequately oriented or inclined to take advantage of the range of academic support options offered by the campus library. While these notions serve only as speculation, they offer some insights that may warrant further investigation.

Summary

The entire set of predictor variables selected for this study explained almost sixty percent of the variation in end of freshman year critical thinking scores. The overall findings support the notion that: 1) there is not a differential impact of residence on cognitive development during college; and 2) college experiences can contribute to cognitive development during college. The findings indicate that students' out-of-the-classroom experiences and interactions influence cognitive development.

These findings are good news for the numbers of students who live off campus. These data suggest that living off campus does not imply cognitive penalties. That is, under certain circumstances, students who commute to campus can exhibit similar cognitive gains to their residential counterparts. We speculate that those circumstances where students who commute are not at a deficit are at institutions that provide support services and

involvement opportunities that accommodate the commuter schedules and lifestyles. Further research could validate and extend this finding.

This research also provides important information for policymakers at commuter institutions. That is, if student academic and support services accommodate the commuter students' needs, these students need not be at a disadvantage in terms of critical thinking development compared to their residential counterparts. The challenge is to further develop those factors of student life that can positively contributed to cognitive development.

The one-year perspective on these data must be noted in the explanation of outcomes. While some prior studies have found significant and substantial gains in cognitive outcomes during the freshman year (Dressel and Mayhew, 1954; Lehmann, 1963, 1968), other studies suggest that a longer time frame is critical in reflecting a truer picture of cognitive development during college (e.g., Khalili and Hood, 1983; Kichener and King, 1981; Welfel and Davison, 1986). This heeds caution in overstating the statistically significant, yet modest increase in critical thinking level of the sample used in this study. The variables found non-significant in this study may need more time to manifest their impact on students' cognitive development. Further research using these variables would be instructive to this notion.

Implications for Future Research

Extending the longitudinal framework of the study could broaden future research findings. Expanding the period over which the study is conducted would allow the influence of the college environment and experiences to effect the students' development. In addition, time may allow the influence of pre-college factors to be diluted by the college experience and environment factors. Much of the prior research on cognitive development during college has taken longer time frame (see Lehmann, 1963, 1968; Khalili and Hood, 1983; Kichener and King, 1981; Welfel and Davison, 1986; Baxter Magolda, 1992). Thus, an extended longitudinal framework would enhance the comparison value of this study to prior research.

The institutions used in sample were selected in attempt to balance of commuter and resident students represented. As suggested earlier, this balance may have contributed to the unexpected results of the analyses. This lesson suggests that future research intended to examine the influences of residence and/or college experiences on cognitive development should keep the residential mix of the institutions in mind. Future studies also should examine the similarities and differences in the experiences of commuter and resident students as these measures influence various outcome measures. Finally, comparative studies of cognitive development at institutions with a balance of resident and commuter students, institutions that are predominantly commuter, and those that are predominantly residential would add to the discussion of how an institution's structure and environment can impact on those aspects of college life that influence cognitive development.

Limitations

This study has certain limitations which should be kept in mind when interpreting the findings. First, while the overall sample is multi-institutional and consists of a variety of institutions nationwide, the fact that the sample used in these analyses were deliberately limited to institutions with fairly even distribution of commuter and resident students means that the results cannot necessarily be generalized to the overall NCPSTL sample which participated in the survey or all colleges in the country. Caution must especially be taken in

discussing the results in the context of the bias in the types of institutions (predominantly commuter) in the study sample. Second, this study examines the influences of a number of variables on the development of critical thinking skills during the freshman year. It is not clear how these variables might affect critical thinking skills in subsequent years. We cannot be certain that any patterns or influences reported here would hold in later years of college. Clearly, an extended longitudinal framework for analysis would enhance the power of the results.

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